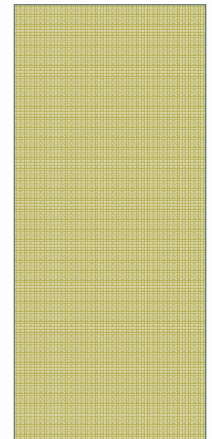
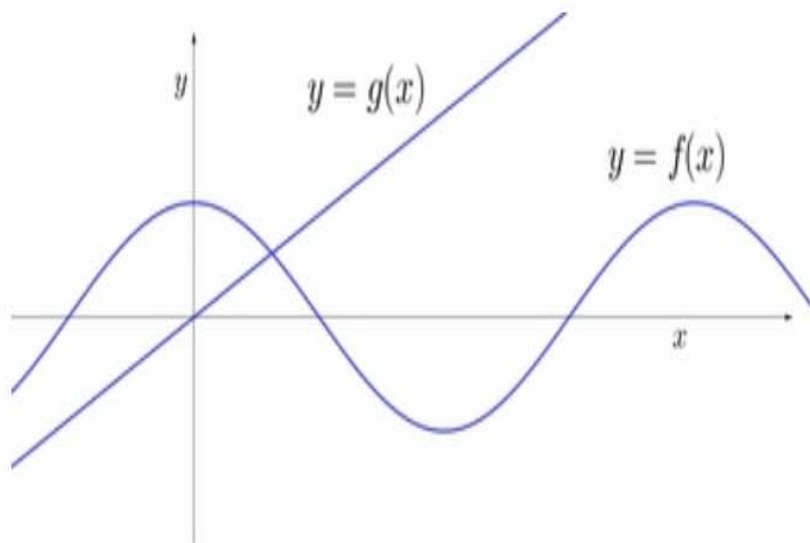


PRESENTED BY:
DANA GONZALEZ
JENNIFER HAGMAN
KELLI WASSERMAN

A PICTURE IS WORTH A
THOUSAND WORDS



Use the graph (for example, by marking specific points) to illustrate the statements in (a)–(d). If possible, label the coordinates of any points you draw.



- a. $f(0) = 2$
- b. $f(-3) = f(3) = f(9) = 0$
- c. $f(2) = g(2)$
- d. $g(x) > f(x)$ for $x > 2$

“Functions are often studied and understood as **families**, and students should spend time studying functions within a family, varying **parameters** to develop an understanding of how the parameters affect the graph of function and its key features.”^{F-IF.7}

(The Common Core Standards Writing Team)

*Progressions for the Common Core State Standards in Mathematics
(draft)*

WHAT ARE...

- FAMILIES

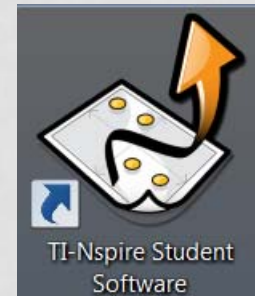
- PARAMETERS

"A parameter is a quantity that influences the output or behavior of a mathematical object but is viewed as being held constant."

Parameter definition by Duane Q. Nykamp is licensed under a [Creative Commons Attribution-Noncommercial-ShareAlike 3.0 License](#).

LINEAR FAMILY

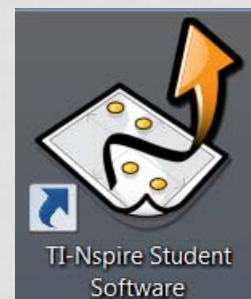
- How can the equation of a linear function be written?



LINEAR FAMILY

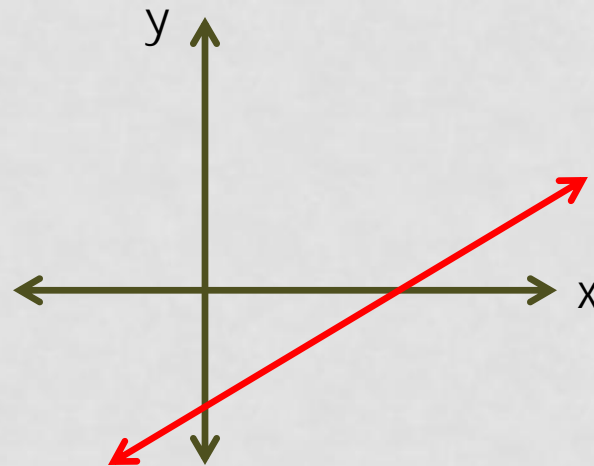
- Parent graph

$$y = x$$



WHICH EXPRESSION?

Which of the following could be an expression for the function of a real variable x whose graph is shown below? Explain.



$$y = 3x - 5$$

$$-y = -2x + 7$$

$$y - 4 = \frac{1}{2}(x - 2)$$

$$y + 2 = -2(x - 1)$$

$$y = \frac{1}{3}x - 5$$

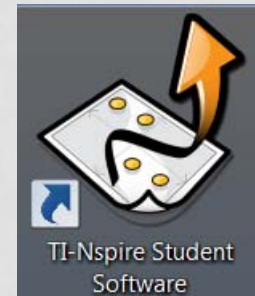
$$-\frac{1}{3}y = -3\left(x - \frac{1}{9}\right)$$

$$4 = 0.5x - 2y$$

$$-8 = -5x + 4y$$

QUADRATIC FAMILY

- How can the equation of a quadratic function be written?



QUADRATIC FAMILY

- Parent graph

$$y = x^2$$



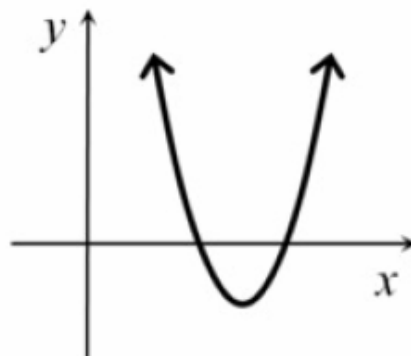
Illustrative Mathematics

F-IF Which Expression?

Alignment 1: F-IF.C.8.a

Not yet tagged

Which of the following could be an expression for the function of a real variable x whose graph is shown below? Explain.



$$(x + 12)^2 + 4$$

$$-(x - 2)^2 - 1$$

$$(x + 18)^2 - 40$$

$$(x - 17)^2 - 15$$

$$-4(x + 2)(x + 3)$$

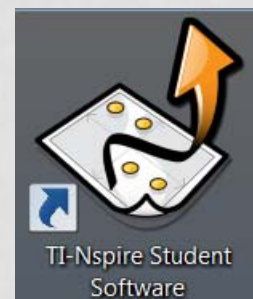
$$(x + 4)(x - 6)$$

$$(x - 12)(-x + 18)$$

$$(24 - x)(40 - x)$$

CUBIC FAMILY

- How can the equation of a cubic function be written?



CUBIC FAMILY

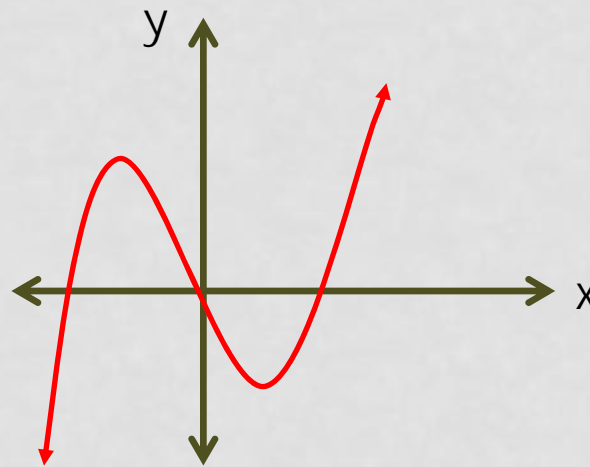
- Parent graph

$$y = x^3$$



WHICH EXPRESSION?

Which of the following could be an expression for the function of a real variable x whose graph is shown below? Explain.



$$3(x-5)^3 - 4 = y \quad (x-2)(x^2 + 2x) = y$$

$$-2(x-4)^3 + 4 = y$$

$$3(x-5)^3 = y$$

$$(2-x)(x^2 - 2x) = y \quad (x-2)\left(x + \frac{1}{2}\right)(x+2) = y$$

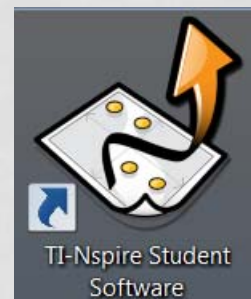
$$\frac{-1}{2}(x+3) + 2 = y$$

$$x^3 = y$$

QUARTIC FAMILY : $Y =$

- Parent graph

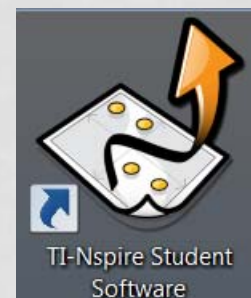
$$y = x^4$$



QUINTIC FAMILY : $Y =$

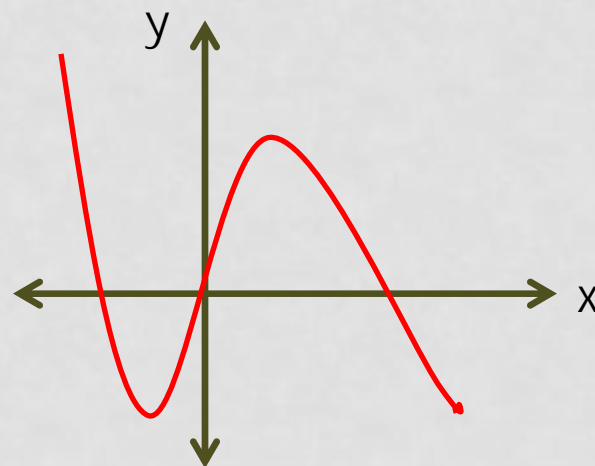
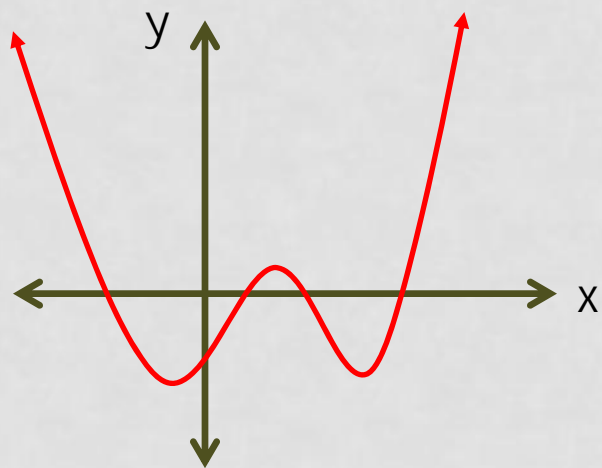
- Parent graph

$$y = x^5$$



WHICH EXPRESSION?

What could be an expression for the function of a real variable x whose graph is shown below? Explain.



CLOSER

- Sort the following:

- Equation
- Table
- Graph

- Linear : $y = -(x+3)$ and $y = -x + 3$
- Quadratic : $y = (x+2)^2$, $y = x^2 + 2$ $y = a(x-h)^2 + k$
- Cubics: $y = -1(x+1)^3$, $y = x^2 + 2$ $y = a(x-h)^2 + k$

GRAPHING CALCULATOR APPS

Android

Algeo - free

Mathlab -free

MathPac – \$9.99

Graphing Calculator
Herbert Law – free

Andy-83, -85, -86 free

I-phone(pad)

Free Graphing Calculator
by William Jockusch

Graphing Calculator HD -
\$1.99

Graphing Calc

Quick Graph: Your
Graphing Calculator - Free

COMMON CORE

1. Mathematical Practices

1. 7 Look for structure and make use of structure
2. 8 Look for and express regularity in repeated reasoning

2. Grade Level Standards

1. 6th : **EE9**
2. 7th : **EE2, EE4**
3. 8th : **F1, F2, F3, F5**
4. Algebra I, Algebra II, Mathematics I, II, III, Functions :
F-IF7, F-IF 8, F-BF3

GOAL

“Functions are often studied and understood as **families**, and students should spend time studying functions within a family, varying **parameters** to develop an understanding of how the parameters affect the graph of function and its key features.^{F-IF7}”
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